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CORONARY
State-of-the-Art Paper

Inside This Issue

Current Status of Rotational Atherectomy

345

Matthew I. Tomey, Annapoorna S. Kini, Samin K. Sharma

Rotational atherectomy (RA) facilitates procedural and angiographic success in percutaneous coronary intervention of complex, rigid lesions, particularly those affected by severe calcification. Evidence for long-term reduction in restenosis and major adverse cardiovascular events, however, is lacking. We review RA technique, safety, and efficacy data in the era of drug-eluting stents, strategies to prevent and manage complications, including slow-flow/no-reflow and burr entrapment; and appropriate use in the context of broader evolution in management of stable ischemic heart disease.

Clinical Research

Long-Term Clinical Outcomes After Percutaneous Coronary Intervention Versus Coronary Artery Bypass Grafting for Ostial/Midshaft Lesions in Unprotected Left Main Coronary Artery From the DELTA Registry: A Multicenter Registry Evaluating Percutaneous Coronary Intervention Versus Coronary Artery Bypass Grafting for Left Main Treatment

354

Toru Naganuma, Alaide Chieffo, Emanuele Meliga, Davide Capodanno, Seung-Jung Park, Yoshinobu Onuma, Marco Valgimigli, Sanda Jegere, Raj R. Makkar, Igor F. Palacios, Charis Costopoulos, Young-Hak Kim, Piotr P. Buszman, Tarun Chakravarty, Imad Sheiban, Roxana Mehran, Christoph Naber, Ronan Margey, Arvind Agnihotri, Sebastiano Marra, Piera Capranzano, Martin B. Leon, Jeffrey W. Moses, Jean Fajadet, Thierry Lefevre, Marie-Claude Morice, Andrejs Erglis, Corrado Tamburino, Ottavio Alfieri, Patrick W. Serruys, Antonio Colombo

This study compared clinical outcomes after percutaneous coronary intervention (PCI) with drug-eluting stents (DES) ($n = 482$) versus coronary artery bypass graft (CABG) ($n = 374$) for ostial/midshaft lesions in an unprotected left main coronary artery (ULMCA). At 1,293 days, there were no significant differences in the propensity score-adjusted analyses for the composite endpoint of all-cause death, myocardial infarction, and cerebrovascular accident and major adverse cardiac and cerebrovascular events. However, a higher incidence of target vessel revascularization was observed in the PCI compared with the CABG group, with a trend toward higher target lesion revascularization. In conclusion, this study demonstrates that PCI for ostial/midshaft lesions in a ULMCA is associated with clinical outcomes comparable to those observed with CABG at long-term follow-up, despite the use of older, first-generation DES.

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(continued on A-21)

Mortality in South Asians and Caucasians After Percutaneous Coronary Intervention in the United Kingdom: An Observational Cohort Study of 279,256 Patients From the BCIS (British Cardiovascular Intervention Society) National Database

362

Daniel A. Jones, Sean Gallagher, Krishnaraj S. Rathod, Simon Redwood, Mark A. de Belder, Anthony Mathur, Adam D. Timmis, Peter F. Ludman, John N. Townend, Andrew Wrang, on behalf of the NICOR (National Institute for Cardiovascular Outcomes Research)

This study investigated the impact of ethnicity on mortality after percutaneous coronary intervention (PCI) in a national patient cohort. A total of 279,256 patients underwent PCI, of whom 259,318 (92.9%) were Caucasian and 19,938 (7.1%) were South Asian. South Asians were younger and had more extensive disease and major risk factors, particularly diabetes. Unadjusted mortality rates were lower for South Asians compared with Caucasians. Age-adjusted analysis revealed increased mortality (hazard ratio: 1.24; 95% confidence interval: 1.18 to 1.30) but with no difference after adjustment (hazard ratio: 0.99; 95% confidence interval: 0.94 to 1.05). In South Asians, high diabetes rates exert an adverse influence on mortality, but ethnicity itself is not an independent outcome predictor.

Impact of Cigarette Smoking on Extent of Coronary Artery Disease and Prognosis of Patients With Non-ST-Segment Elevation Acute Coronary Syndromes: An Analysis From the ACUTY Trial (Acute Catheterization and Urgent Intervention Triage Strategy)

372

Jason O. Robertson, Ramin Ebrahimi, Alexandra J. Lansky, Roxana Mehran, Gregg W. Stone, A. Michael Lincoff

This study evaluated outcomes for smokers with moderate- to high-risk non-ST-segment elevation acute coronary syndromes (NSTEMI-ACS) from the 13,819-patient ACUTY (Acute Catheterization and Urgent Intervention Triage Strategy) trial. Smoking has been associated with the “paradox” of reduced mortality after acute myocardial infarction (MI). In contrast to the paradox previously described in ST-segment elevation MI, our analysis finds smoking to be an independent predictor of higher 1-year mortality in patients presenting with NSTEMI-ACS (hazard ratio: 1.37, 95% confidence interval: 1.07 to 1.75; $p = 0.013$), and our angiographic study demonstrates coronary artery disease in smokers that is comparable to that in nonsmokers but evident ~ 1 decade earlier.

EDITORIAL COMMENT

Impact of Smoking Status in Patients With Non-ST-Segment Elevation Myocardial Infarction: The Reverse Smoker's Paradox

380

Jorge A. Belardi

A-22

**Efficacy of a Minicourse in Radiation-Reducing Techniques in Invasive Cardiology:
A Multicenter Field Study**

382

*Eberhard Kuon, Kerstin Weitmann, Wolfgang Hoffmann, Marcus Dörr, Thorsten Reffelmann,
Astrid Hummel, Alexander Riad, Mathias C. Busch, Klaus Empen, Stephan B. Felix*

In a representative multicenter field study, an educational 90-min minicourse in lower-irradiating invasive techniques significantly ($p < 0.001$) reduced patients' median values due to coronary angiography as follows: overall dose area product (DAP) (−48.4%: from baseline 26.5 to 13.7 Gy \times cm²); fluoroscopy times (−20.8%); radiographic runs (−9.1%); frames/run (−18.6 %); frames (−29.6%); radiographic DAP/frame (−27.4%); and fluoroscopic DAP/s (−39.3%). Multilevel analysis ($p < 0.001$) revealed higher DAP for male sex, increasing body mass index and age, and—owing to different settings during image acquisition—for advanced versus older catheterization systems.

EDITORIAL COMMENT

**Mandatory Radiation Safety Training for Fluoroscopy Imaging:
A Quality Improvement Priority or Unnecessary Oversight?**

391

Charles E. Chambers

**STRUCTURAL
Clinical Research**

**MitraClip Therapy in Surgical High-Risk Patients: Identification of Echocardiographic
Variables Affecting Acute Procedural Outcome**

394

*Edith Lubos, Michael Schlüter, Eik Vettorazzi, Britta Goldmann, Daniel Lubs,
Johannes Schirmer, Hendrik Treede, Hermann Reichenspurner, Stefan Blankenberg,
Stephan Baldus, Volker Rudolph*

Acute procedural failure of MitraClip therapy was encountered in 32 (10.7%) of 300 consecutively treated surgical high-risk patients (age 75 ± 9 years, 190 [63%] men). Exact logistic regression analyses identified mean transmitral pressure gradient (TMPG), effective regurgitant orifice area (EROA), and mitral valve orifice area (MVOA) as independent predictors of acute procedural failure. Classification tree analysis revealed that an EROA >70.8 mm² was associated with a 25% rate of “clip failure” (inadequate MR reduction despite MitraClip implantation), whereas the presence of both an MVOA ≤ 3.0 cm² and a TMPG ≥ 4 mm Hg was associated with a 37.5% rate of aborted procedures (no clip implanted).

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Effect of Catheter-Based Patent Foramen Ovale Closure on the Occurrence of Arterial Bubbles in Scuba Divers

403

Jakub Honěk, Martin Šrámek, Luděk Šef, Jaroslav Januška, Jiří Fiedler, Martin Horváth, Alěš Tomek, Štěpán Novotný, Tomáš Honěk, Josef Veselka

Patent foramen ovale (PFO) is a risk factor of decompression sickness in divers due to paradoxical embolization of bubbles. To date, the effectiveness of catheter-based PFO closure in divers has not been demonstrated. A total of 47 divers with PFO (PFO group) or after a catheter-based PFO closure (closure group) were examined after a simulated dive. Venous and arterial bubbles were detected sonographically. Catheter-based PFO closure was associated with the complete elimination of arterial bubbles. This suggests its potential role in the prevention of unprovoked decompression sickness recurrence in divers.

EDITORIAL COMMENT

The PFO Gets Blamed Again...Perhaps This Time it Is Real

409

Alfred A. Bove

**PERIPHERAL
Clinical Research**

Drug-Eluting Balloons for the Treatment of the Superficial Femoral Artery In-Stent Restenosis: 2-Year Follow-Up

411

Vittorio Virga, Eugenio Stabile, Giancarlo Biamino, Luigi Salemmme, Angelo Cioppa, Giuseppe Giugliano, Tullio Tesorio, Linda Cota, Grigore Popusoi, Armando Pucciarelli, Giovanni Esposito, Bruno Trimarco, Paolo Rubino

The use of drug-eluting balloons (DEBs) for the treatment of superficial femoral artery (SFA) in-stent restenosis (ISR) is associated with a satisfactory primary patency rate at 1 year, but no data are available for longer follow-up. The aim of this prospective registry was to evaluate safety/efficacy of the use of DEBs for the treatment of SFA ISR at 2 years. During follow-up, the primary patency rate at 2 years was 70.3 %. The data suggest that adjunctive use of DEBs for the treatment of SFA ISR is a safe and effective therapeutic strategy up to 2 years of follow-up.

Comparison Between Covered and Bare Cheatham-Platinum Stents for Endovascular Treatment of Patients With Native Post-Ductal Aortic Coarctation: Immediate and Intermediate-Term Results

416

Babram Sobrabi, Peiman Jamsbidi, Alireza Yaghoubi, Afshin Habibzadeh, Yashar Hashemi-aghdam, Araz Moin, Babak Kazemi, Samad Ghaffari, Mohammad Reza Abdolabzadeh Baghayi, Khalil Mahmoody

In this randomized clinical trial, we compared outcome of stenting with bare or covered Cheatham-Platinum stents in severe native coarctation of aorta patients. Both groups had 100% success, with remarkable effects on hemodynamic status. During follow-up, the rate of recoarctation and pseudoaneurysm formation was quite low. These findings indicate that coarctation of aorta stenting is a safe procedure.

EDITORIAL COMMENT

Covered Stents for Coarctation of the Aorta: Treating the Interventionalist or the Patient?

424

Ziyad M. Hijazi, Damien P. Kenny

PHARMACODYNAMICS
Clinical Research

Pharmacodynamic Effects of Cangrelor on Platelet P2Y₁₂ Receptor-Mediated Signaling in Prasugrel-Treated Patients **CME**

426

Fabiana Rollini, Francesco Franchi, Antonio Tello-Montoliu, Ronakkumar Patel, Andrew Darlington, José Luis Ferreiro, Jung Rae Cho, Ana Muñoz-Lozano, Bhaloo Desai, Martin M. Zenni, Luis A. Guzman, Theodore A. Bass, Dominick J. Angiolillo

Variability in prasugrel pharmacodynamic effects has been shown, particularly in high-risk settings. Cangrelor is a potent intravenous P2Y₁₂ receptor inhibitor. We assessed the in vitro P2Y₁₂ receptor inhibitory effects of cangrelor on platelets from patients on maintenance prasugrel therapy treated with 2 reloading dose regimens (30 mg or 60 mg). In the absence of cangrelor, prasugrel reloading significantly reduced platelet reactivity index (PRI). Cangrelor was overall associated with further P2Y₁₂ receptor inhibitory effects. In patients reloaded with prasugrel 30 mg, cangrelor decreased PRI at each time point. In patients reloaded with prasugrel 60 mg, cangrelor decreased PRI at baseline and 1 h, but not at 4 h.

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Pharmacodynamic Effects During the Transition Between Cangrelor and Ticagrelor

435

David J. Schneider, Zubin Agarwal, Naveen Seecheran, Friederike K. Keating, Prospero Gogo

Because consistent antiplatelet effects are advantageous after coronary intervention, we assessed pharmacodynamic effects during transition between 2 reversible P2Y₁₂ antagonists, cangrelor and ticagrelor. Participants (n = 12) with stable coronary artery disease on aspirin 81 mg daily received a bolus plus infusion of cangrelor on study day 1 and were given a loading dose of ticagrelor (180 mg) during the infusion. Participants took ticagrelor for 3 days and then stopped either 12 or 24 h before a second bolus plus infusion of cangrelor. Ticagrelor can be administered before, during, or after treatment with cangrelor without significantly affecting antiplatelet effects of either agent.

**IMAGES IN
INTERVENTION**

Alcohol Ablation of Right Ventricular Outflow Tract Obstruction

443

Sivasubramanian Ramakrishnan, Balram Bhargava, Sandeep Seth, Balram Airan

This article has accompanying videos that can be viewed in the online version of this issue.

**In-Stent Thin-Cap Fibroatheroma After Drug-Eluting Stent Implantation:
Ex-Vivo Evaluation of Optical Coherence Tomography and Intracoronary
Angioscopy**

446

*Kenichi Fujii, Hiroyuki Hao, Takahiro Imanaka, Taro Kawano, Tadateru Takayama,
Atsushi Hirayama, Tsutomu Yamada, Hatsue Ishibashi-Ueda, Seiichi Hirota, Tohru Masuyama*

**ONLINE FEATURE Successful Transcatheter Aortic Valve Replacement in
a Patient With a Sinus of Valsalva Aneurysm**

e29

Cara Hendry, Anthony Della Siega, Imad J. Nadra, Simon D. Robinson

**ONLINE FEATURE Follow-Up Improvement of Distal Vessel Diameter After
Successful Chronic Total Coronary Occlusion Recanalization**

e31

Gabriele L. Gasparini, Marco L. Rossi, Patrizia Presbitero

**ONLINE FEATURE Self-Expanding Stent Peeling Away From Overlapping
Balloon-Expandable Stent Causing Late Acquired Aneurysm Formation and Stent
Malapposition**

e35

Chi Yuen Chan, Eugene B. Wu, Bryan P. Yan

ONLINE FEATURES

These articles do not appear in the printed issue. They are available in the online version of this issue.

**LETTERS TO
THE EDITOR**

**Platelet Reactivity Is Preferred Over Genotyping in Monitoring Efficacy of
Antiplatelet Therapy**

448

Nicoline J. Breet, Jurrien M. ten Berg

REPLY

*Chiara Viviani Anselmi, Carlo Briguori, Roberta Roncarati, Laura Papa, Gabriella Visconti,
Amelia Focaccio, Francesca De Micco, Michael V. G. Latronico, Paolo Pagnotta,
Gianluigi Condorelli*

EDITOR'S PAGE

Is Participation in Clinical Research a Duty?

450

Spencer B. King III